River Road Extension

Route Location and Feasibility Study

The REGIONAL MUNICIPALITY of WATERLOO

DEPARTMENT of PLANNING and DEVELOPMENT

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19 June, 1981.

Mr. G.A. Thompson, P.Eng.,
Director of Roads & Traffic,
Engineering Department,
The Regional Municipality of Waterloo,
Marsland Centre,
Waterloo, Ontario
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RIVER ROAD EXTENSION: ROUTE LOCATION & FEASIBILITY STUDY

Dear Sir,

It is with pleasure that we submit this final document on the Route Location and Feasibility Study for River Road Extension from King Street East to Goodrich Drive in the City of Kitchener, Regional Municipality of Waterloo.

The document summarizes the background information and context of the Study, the technical analyses and evaluation leading to selection of a route corridor and a recommended route and details the technical recommendations concerning that route.

The alternative route corridors evaluated are shown in Plan and Profile and the recommended route is detailed at a functional level on Plan Profile drawings for later reference and implementation purposes.

This document incorporates the conclusions of the Project Team and the comments on the Draft document received through yourself and Regional Staff. We and our sub-consultants gratefully acknowledge the cooperation and generous assistance received during the course of this challenging project.

Respectfully submitted.

J.A.J. Knox, O.A.L.A., P.Eng.
President

JAJK:SLV
1348

KNOX MARTIN KRETCH LIMITED

THE REGIONAL MUNICIPALITY OF WATERLOO

RIVER ROAD EXTENSION

ROUTE LOCATION AND FEASIBILITY STUDY

June 1981

Project 1348

KNOX MARTIN KRETCH LIMITED
Consulting Engineers, Planners, Landscape Architects
220 Advance Boulevard, Brampton, Ontario L6T 4J5

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Geotechnical	PETO MacCALLUM LIMITED, Kitchener

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   - 1.1 Background and General Terms of Reference
     Department of Planning & Development: June 1980
   - 1.2 Proposal for Consulting Services
     Knox Martin Kretch Limited: 12 June 1980

2. ENVIRONMENTAL ASSESSMENT
   - 2.1 Environmental Assessment
     Limnoterra March 1981
   - 2.2 The Regional Municipality of Waterloo
     Ecological and Environmental Advisory Committee Minutes
     30 January 80, 13 February 80, 10 September 80

3. GEOTECHNICAL CONDITIONS
   - 3.1 Preliminary Soils Investigation, Highway 8 Overpass
     Peto MacCallum Ltd., July 1980
   - 3.2 Preliminary Soils Investigation, Soil Profile
     Peto MacCallum Ltd., September 1980

4. BIBLIOGRAPHY OF RELATED STUDIES

5. CORRESPONDENCE
   - 5.1 Letter Regional Municipality of Waterloo to Ontario Ministry of the Environment 6 August 1980
   - 5.2 Letter Ontario Ministry of the Environment to Regional Municipality of Waterloo 19 November 1980
   - 5.3 Letter Regional Municipality of Waterloo to Ontario Ministry of Transportation and Communications 17 December 1980
   - 5.4 Letter Ontario Ministry of Transportation and Communications to Regional Municipality of Waterloo 26 January 1981

STUDY PARTICIPANTS

The Study was carried out under the direction of the Regional Department of Planning and Development assisted by a Project Team consisting of the following persons.

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For liaison and communication purposes the following persons represented resident and private developer interests:

L. Rudrum	Alderman - Ward 7 (to Dec 80) City of Kitchener
G. W. Wright	Manager of Operation, Land Development Major Holdings & Developments Limited

SUMMARY AND RECOMMENDATIONS

The River Road Extension Route Location and Feasibility Study was broad ranging and comprehensive in response particularly to the severe topography and environmentally significant features within the Study Area.

This document summarizes the study conclusions and recommends the selected route for River Road Extension through the Hidden Valley Community in Kitchener. The document also incorporates reports on the supporting environmental, geotechnical and traffic studies which contributed significantly to the conclusions and recommendations.

The study purpose was to select and recommend the most suitable route for River Road Extension as a primary road in the context of the future Hidden Valley Community through coordinated Regional and City land use and transportation planning.

The six plausible route corridors were analysed and evaluated by focusing on four primary considerations: Environment, Community, Geometry and Costs. The presence of Environmentally Sensitive Policy Area 27 (ESPA 27) Hidden Valley and Bird Ridge, prescribed that particular attention be given to impacts of the road on environmental features. Documented environmental evaluation at appropriate levels of detail accompanied the selection of the preferred corridor and a route within that corridor and concluded with a full Environmental Assessment of the selected route. The evaluations and Environmental Assessment were reviewed by the Regional Ecological and Environmental Advisory Committee who concurred with the route selected with impact mitigation measures.

The recommended impact mitigation includes special storm water management measures through construction of a storm water discharge facility in the form of a biological weir adjacent to the road to disperse storm water discharges into the wetlands. Other mitigation measures include sedimentation and siltation control during construction.

SUMMARY AND RECOMMENDATIONS (continued)

The recommended route, as illustrated on Plan 4, provides an almost continuously curving connection from existing River Road at King Street East to Goodrich Drive with potentially very interesting vistas and views particularly of the central wetland and esker. From King Street East the route proceeds south on a gently curving alignment across Highway 8 at a small skew angle, abuts the trunk Bell Telephone pole line, avoids most of the south edge of the north woodlot and proceeds to join existing Goodrich Drive at Hidden Valley Road through three sharper curves and two reverses after intruding into the north and west fringes of the Environmentally Sensitive Central Wetland. Accommodation for a full interchange with Highway 8 is recommended.

The recommended route passes through essentially undeveloped land held by development interests south of Highway 8. It is adjacent on the west of an approved subdivision incorporating provision for the route to the north of Highway 8.

The preliminary Secondary Plan for the northern portion of the Hidden Valley Community integrates with the recommended route and proposes industrial and office uses north of the route. Residential and ancilliary uses are anticipated generally south of the route to be implemented through a further Secondary Plan.

The functional design components all comply with the established criteria for maximum horizontal and vertical curvature; minimum sight distance and maximum gradients.

To safely accommodate the curving alignment and connecting road configuration an urban cross-section is recommended with three paved lanes including a central turning lane at Stage 1 and five paved lanes at Stage 2. Staged construction is recommended to respond to traffic warrants and development of adjacent lands.

The recommended basic right-of-way is 100 feet widening to 130 feet to accommodate the storm water discharge facility. The severe topography of the lands adjacent to the recommended route in some locations will require major grading which will extend beyond the basic right-of-way. In such locations provision should be made in the grading plans for adjacent development to integrate grades with the roadway and with noise attenuation provisions where required.

SUMMARY AND RECOMMENDATIONS (continued)

Estimates of the traffic sound levels adjacent to the route for the volume of traffic predicted at the 400,000 Regional population level show sound levels acceptable for the proposed industrial and office uses north of the route but greater than the recommended maximum of 55 dBA for outdoor residential areas. Satisfactory noise attenuation measures should be devised at the time detailed proposals for residential development south of the route are reviewed.

THE REGIONAL MUNICIPALITY OF WATERLOO

RIVER ROAD EXTENSION
ROUTE LOCATION AND FEASIBILITY STUDY

1. PURPOSE, SCOPE AND METHODOLOGY

1.1 PURPOSE

The Regional Transportation Plan Review approved by Regional Council on 19 July 1979 identified a Priority 3 (1989-2001) need for the River Road Extension south from King Street and suggested a generalized route location through the Hidden Valley Community to link to existing Goodrich Drive and further west to Bleams Road.

The purpose of this Route Location and Feasiblity Study is to identify, assess and evaluate alternative route locations for River Road Extension from King Street East to Goodrich Drive and to select and recommend the most suitable route in relation to Environmentally Sensitive Policy Area 27. The Study conforms to the requirements of the Regional Official Policies Plan including those related to Environmentally Sensitive Policy Area 27 (ESPA 27) and adoption of the recommendations will allow coordinated land use and transportation planning in the current and continuing community planning process in accord with the requirements of the City of Kitchener Official Plan and the Regional Official Policies Plan.

1.2 SCOPE

The scope of the Study is to select the route for the portion of River Road Extension southerly from existing River Road at King Street East across Highway 8 and westerly through the Hidden Valley Community to link with existing Goodrich Drive west of Hidden Valley Road.

The Study Area comprises the Hidden Valley Community extended north to King Street East as illustrated on Plan 1 accompanying the Terms of Reference, Appendix 1.1.

1.3 METHODOLOGY

The Background and General Terms of Reference for the Study were established by the Planning & Development Committee of the Regional Municipality of Waterloo in June 1980 and comprise Appendix 1.1. The Consultant's Proposal for Consulting Services comprises Appendix 1.2.

Base data available at the commencement of the Study included the Geometric Design Standards included in the Terms of Reference ; Topographic Mapping of the Study Area at 1" = 200' and 1" = 40' ; an aerial photomosiac of the Study Area and related studies listed in the Bibliography comprising Appendix 4.

In summary the Study Methodology entailed the following elements:

1. Assemble and review pertinent data and information.
2. Prepare suitable base plans.
3. Identify and summarize in Plan, Profile and Text form alternative routes and carry out a preliminary level engineering and environmental evaluation to select the preferred alignment corridor.
4. Obtain supplementary geotechnical data related to the selected corridor and the crossing of Highway 8.
5. Establish major route considerations and related objectives and carry out engineering, community planning, cost and intermediate level environmental evaluations of routes within the selected corridor leading to the selection of the preferred route.
6. Prepare functional design including Plan and Profile drawings of the selected route showing also the proposed linear and cross-section staging of construction.
7. Integrate traffic analysis data provided by Waterloo Region Staff into the functional design of the selected route.
8. Integrate conclusions of the analysis of Highway 8 traffic and the potential interchange with River Road Extension provided by the Ontario Ministry of Transportation and Communications into the functional design of the selected route.
9. Carry out traffic noise analyses based upon the traffic data provided by Waterloo Regional Staff and prepare noise contours.
10. Prepare estimates of staged project construction costs.
11. Prepare Study Report.

1.4 PUBLIC PARTICIPATION

The Route Location Study recommendations and proposals will form part of the Open Houses and Public Meetings arranged by the Regional Municipality of Waterloo and the City of Kitchener in conjunction with a Regional Official Plan Amendment, a Kitchener Official Plan Amendment and the Hidden Valley Community Secondary Plan.

2. STUDY CONTEXT

2.1 EXISTING AND PROPOSED DEVELOPMENT

Most of the Study Area in the Hidden Valley Community south of Highway 8 is agricultural land surrounding central wetlands and woodlands while the land north of Highway 8 which has entered the development process is fallow.

Two separate groupings of residences on estate size lots are established, one on Hidden Valley Road East above the steep bank overlooking the Grand River and the other on Hidden Valley Road South on the higher land overlooking farmland to the Grand River. The East Grouping comprises about 15 dwellings and the South Grouping about 8 dwellings.

The Waterloo Regional Official Policies Plan designates all the Study Area to be in Settlement Policy Area A, which contains the existing areas of settlement in the three Cities and the areas for potential expansion up to the year 2001. The lands adjacent to Highway 8 are designated Policy Area B to define the areas where concentrations of higher density residential uses and higher intensity commercial, industrial, office, institutional and public uses may be located and where a public transit system may be provided. The City of Kitchener Official Plan designates only the lands north of Highway 8 as Regional Policy Area B while the lands south of Highway 8 are not so designated. Highway 8 is designated an existing trunk road and Fairway Road, King Street East, existing River Road and Homer Watson Boulevard are designated existing Primary Roads.

The Waterloo Regional Transportation Plan Review adopted by Regional Council on 19 July 1979 proposes the southward extension of River Road as a Primary Road across Highway 8 through the Hidden Valley Community to link to Goodrich Drive and west to Bleams Road at Manitou Drive as a Priority 3 (1989-2001) project. An amendment to the Regional Official Policies Plan is required to designate the River Road Extension as a Primary Road.

The City of Kitchener Official Plan designates essentially the Regional Environmentally Sensitive Policy Areas and floodplain lands as Major Open Space and the remainder of the Study Area as Low Density Residential with a portion of the southwest extremity Industrial. The Official Plan requires the undertaking of detailed studies as part of a Secondary Plan to be approved prior to processing of severances or Plans of Subdivision within the Hidden Valley Community some of which would be directly affected by River Road Extension. An amendment to the Kitchener Official Plan is required to designate the River Road Extension as a Primary Road and to designate the land use.

2.2 TRANSPORTATION NETWORK

The Study Area south of Highway 8 is somewhat separated from the existing transportation network because of the presence of the Grand River on the south and east and the Grand River Railroad (Canadian Pacific Railroad) on the northwest neither of which are likely to be bridged in this vicinity.

King Street East and specifically the intersection with River Road forms the north Study Area boundary. Highway 8 parallels King Street East about 1000 feet to the south but the Fairway Road interchange provides only indirect access to the Study Area and the Freeport Road interchange connects only to King Street East.

Goodrich Drive provides direct access to the Study Area from Wilson Avenue and will become part of the River Road Extension. The Wabanaki Drive unopened right-of-way links directly to Hidden Valley Road South from Wilson Avenue and Manitou Drive.

River Road Extension will extend west from Wilson Avenue to connect to Bleams Road at Manitou Drive. At that time the Major Road Network will become:

Trunk Road	-	Highway 8
Primary Roads	-	River Road Extension incorporating Goodrich Drive.
	-	King Street East
	-	Manitou Drive
	-	Fairway Road
Collector Roads	-	Wabanki Drive
	-	Wilson Avenue

2.3 SERVICES INFRASTRUCTURE

Trunk watermains 18" and 12" diameter exist on King Street East, Kingsway Drive and Wilson Avenue and 12" diameter sub-trunk mains extend east from Wilson Avenue on Goodrich Drive to Hidden Valley Road West and on Fairway Road to Highway 8 all adjacent or close to the Study Area.

Kitchener Utilities Division propose that the 12" sub-trunk main on Goodrich Drive be extended on River Road Extension to connect to the trunk mains at King Street East at River Road.

Sanitary sewers exist on King Street East flowing east to the Freeport Sewage Pumping Station and forcemain which discharges into a gravity sewer on Fairway Road connecting to the Schneider Trunk Sewer.

Kitchener Public Works Department require provision for sanitary sewers on River Road Extension from Goodrich Drive to near Highway 8 recognizing that these will concentrate to a new sewage pumping station and forcemain discharging to an extension of the Wabanaki Drive gravity sewer connecting to the Schneider Trunk Sewer.

Storm sewers 36" and 48" diameter exist on Hidden Valley Road West from the B.F. Goodrich Plant site south of Goodrich Drive to West Creek and along the west side of the adjacent CPR spur line. All discharge to West Creek and thence into the central Hidden Valley wetland. A 48" diameter storm sewer exists on the CPR right-of-way north of King Street East.

Kitchener Public Works Department require provision for storm sewers on River Road Extension and the preparation and undertaking of storm water management programs for proposed projects including road works. The program for River Road Extension should be coordinated and integrated with the programs for development of the adjacent plans at the detailed design stage with appropriate cost sharing arrangements.

A 4" diameter gas main exists on River Road north from King Street East and on King Street East eastward from River Road. Kitchener Utilities Division propose that a gas main be located on River Road Extension from Goodrich Drive to Highway 8.

The location of all utilities within the River Road right-of-way should be finally coordinated at the detailed design stage.

2.4 TERRAIN

The Study Area is situated in an area of complex glacial events resulting in sub-surface soils varying from hard silt/clay tills, layered tills, sandy tills, to sand and mixed sand and gravel and deposits of alluvium and peat in the central wetlands.

Extensive studies of the terrain have been undertaken and reported on including the Geotechnical Conditions comprising Appendix 3 and the studies referred to in Appendix 4, Bibliography of Related Studies, Items 4,5, and 8.

The geotechnical investigations conducted conclude that, with full consideration at the design stage and careful attention to on-site construction procedures, no significant road construction problems are anticipated. It is proposed that the shallow alluvium and peat along the low central section be removed prior to embankment construction.

Special consideration and supplementary geotechnical investigation will be required at the time of detail design of the north bridge abutment and approach because of the presence of soft organic/alluvial soils.

Topographic elevations in the Study Area vary from 990 to 1090 feet above geodetic datum. All the lands surrounding the flat central wetlands evidence gentle to steep slopes and the esker ridge is extremely steep sided with about 65 feet of relief.

The major and southern part of the Study Area is drained by the Hidden Valley Creek system and associated wetlands and the northern part is drained by Hofstetter Creek. Both Creeks discharge directly into the Grand River a short distance to the east.

2.5 NATURAL ENVIRONMENT

The natural environmental concerns of the Study Area are dominated by Environmentally Sensitive Policy Area 27, Hidden Valley and Bird Ridge, designated in the Waterloo Region Official Policies Plan and the City of Kitchener Official Plan. Much lesser environmental concerns are related to Hofstetter Creek.

The prominant features of ESPA 27 are the central wetland, the pond and outlet stream to the Grand River, the adjacent wooded esker and the hardwoods between the central wetland and Highway 8. Secondary features comprise the abandoned gravel quarry, a small woodlot between Hidden Valley Road north and Highway 8 and the two inflowing streams from the north and west all of which evidence significant modification by human development.

Hofstetter Creek originates in ESPA 27 and flows under and along the north side of Highway 8 to the Grand River.

Environmental aspects of ESPA 27 and the surrounding lands have been studied extensively as referred to in Appendix 4, Bibliography of Related Studies, Items 4,5,6,7 8, 11, 12,13.

3. ROUTE ALTERNATIVES AND EVALUATION

3.1 DESIGN CRITERIA

The following primary Geometric Design Standards and Design Criteria were adopted for evaluation of the route alternatives and corridor and were appropriately adjusted for the functional design of the Recommended Route.

Geometric Design Standards

1.	Design Speed	50 mph
2.	Basic right-of-way	100 feet
3.	Maximum gradient	6%
4.	Configuration	Staged 4 lane urban with auxilliary lanes as required.

Design Criteria

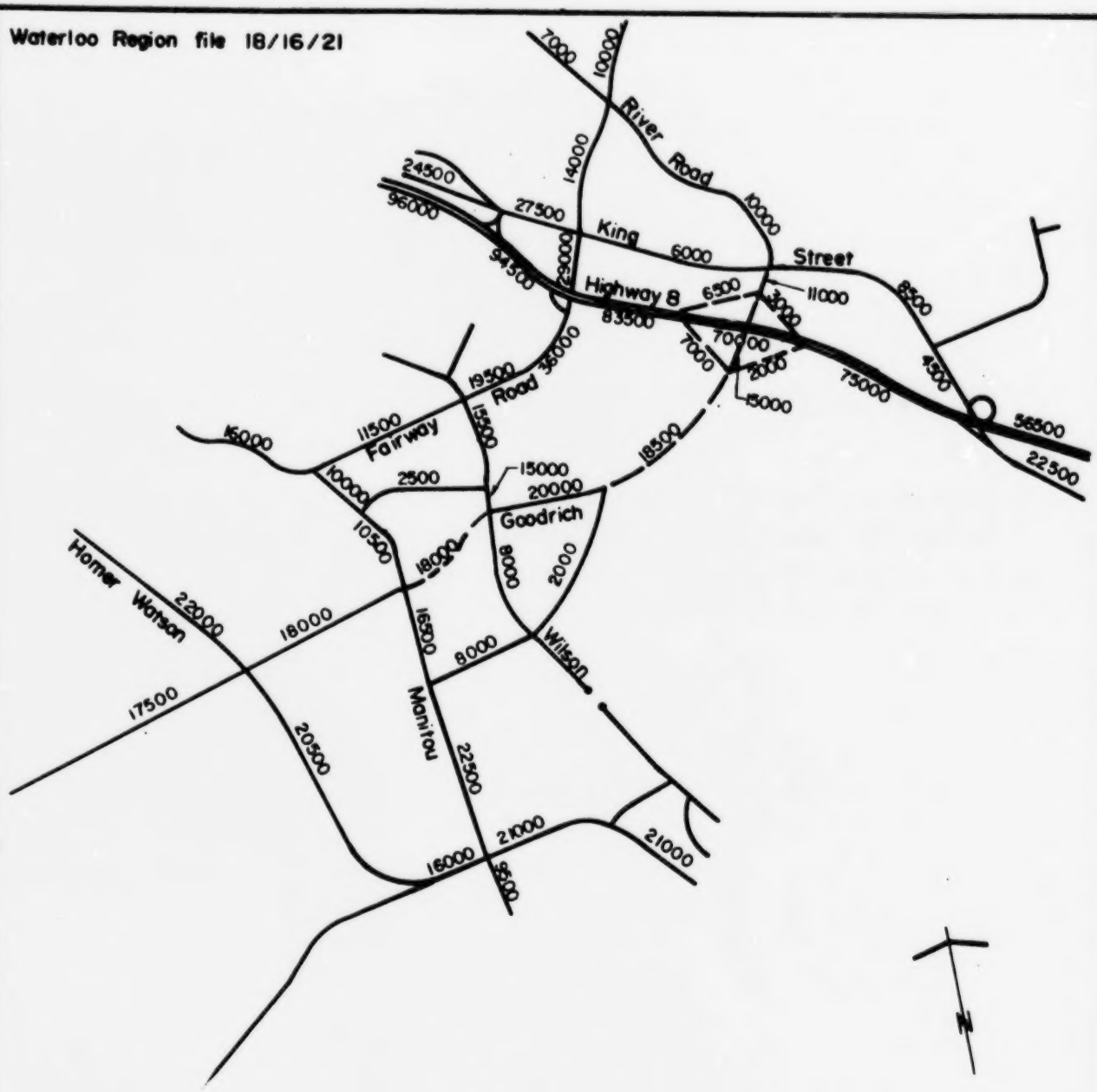
1.	Maximum desired horizontal curvature	7^{o}
2.	Provide horizontal curves with full superelevation runoff or spiral curve length	
3.	Minimum desired vertical visibility curve	600 feet
4.	Posted speed	30 or 35 mph
5.	Lane width : Basic	12 feet
	: With central continuous turning lane	11 feet each

6. Staged 4-lane configuration

   Stage 1 : Lane 1 each way paved; auxilliary turning lanes paved; granular shoulder base for lane 2 each way ; catchbasins ; storm sewers and grass curb ; granular base for future curb and gutter; grassed boulevard ; backslope.

   Stage 2 : Lane 2 each way paved ; curb and gutter

Waterloo Region file 18/16/21



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19 June 1981 Dwg. 1348-C-20

Waterloo Region
River Road Extension

Route Location and Feasibility Study

Annual Average Daily Traffic

400,000 Population Level
Full Hidden Valley Development

Fig. 1

3.2 FUTURE TRAFFIC

The Regional Department of Planning and Development prepared and presented a Traffic Response Study dated 23 October 80 to Project Team Meeting 4. The Study included thirteen Annual Average Daily Traffic (A.A.D.T.) diagrams and thirteen Level of Service diagrams depicting the Existing Network and Conditions; the 400,000 Regional Population Level and 550,000 Regional Population Level both with various River Road Extension and Hidden Valley Community conditions.

Figure 1 illustrates the future traffic conditions selected for this Study consisting of estimated A.A.D.T. traffic volumes on the River Road Extension and surrounding network at the 400,000 Regional Population Level, estimated to be about the year 1992, with full development of the Hidden Valley Community and a full interchange with Highway 8.

3.3 ENVIRONMENTAL IMPACT ASSESSMENT

All the available route alternatives for River Road Extension pass close to or through Regional Environmentally Sensitive Policy Area 27, Hidden Valley and Bird Ridge (ESPA 27), thus requiring assessment of the potential environmental impacts as part of this Study.

Limnoterra, under the direction of Dr. R.J. Planck, were retained as Environmental Sub-Consultants to undertake the Environmental Assessment of the alternative routes and prepare an Environmental Impact Statement for the selected route.

The Environmental Assessment was based upon the studies listed in Appendix 4, Bibliography of Related Studies, as Items 4, 5 and 6. A Working Paper assessing and evaluating the six alternative routes was presented to Project Team Meeting 1 and a second Working Paper evaluating and proposing mitigation measures was presented to Project Team Meeting 2 assessing routes within the selected corridor in more detail.

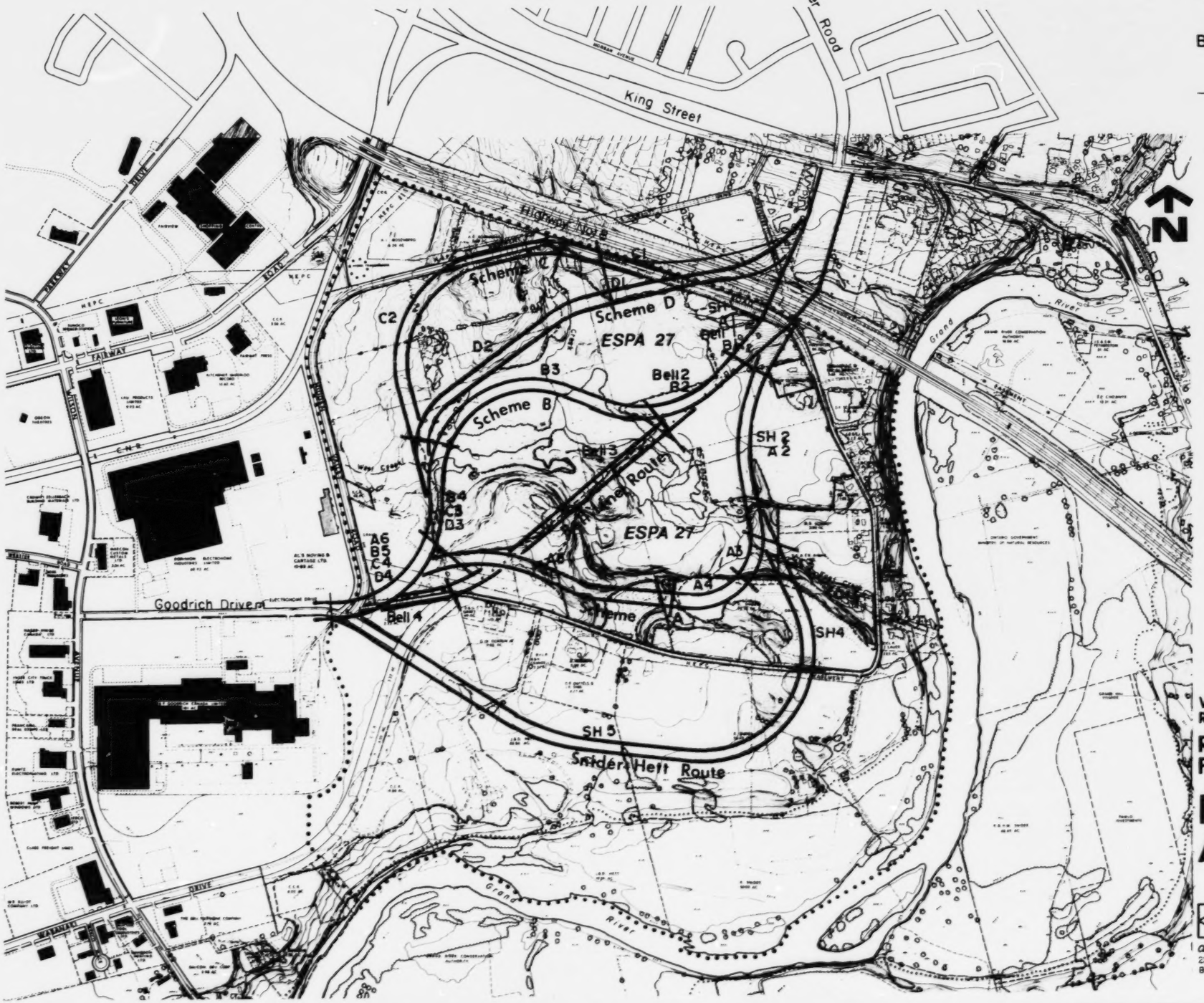
Following determination of the Selected Route and the interchange with Highway 8 the Environmental Impact Statement (EIS) was finalized and included as Appendix 2.1.

3.4 ALTERNATIVE ROUTE CORRIDORS

Six route corridor alternatives, illustrated on Plan 1, were chosen to represent all the plausible corridors for River Road Extension through the Study Area.

The following summarizes the rationale for each corridor starting from the most southerly.

Snider-Hett - Represents a route corridor passing to the east and south of essentially all of ESPA 27 above the Grand River Flood plain and separated from the existing residential clusters on Hidden Valley Road as much as possible. This is the longest route corridor considered.



Legend

B3 Environmental Segment
(refer to Appendix 2.1)

E.S.P.A. Boundary
(from W.R.O.P.P.)

Waterloo Region
River Road Extension

Route Location and Feasibility Study

Route Corridor Alternatives

Knox Martin Kretch Limited

100 0 200 metres
800 0 800 feet

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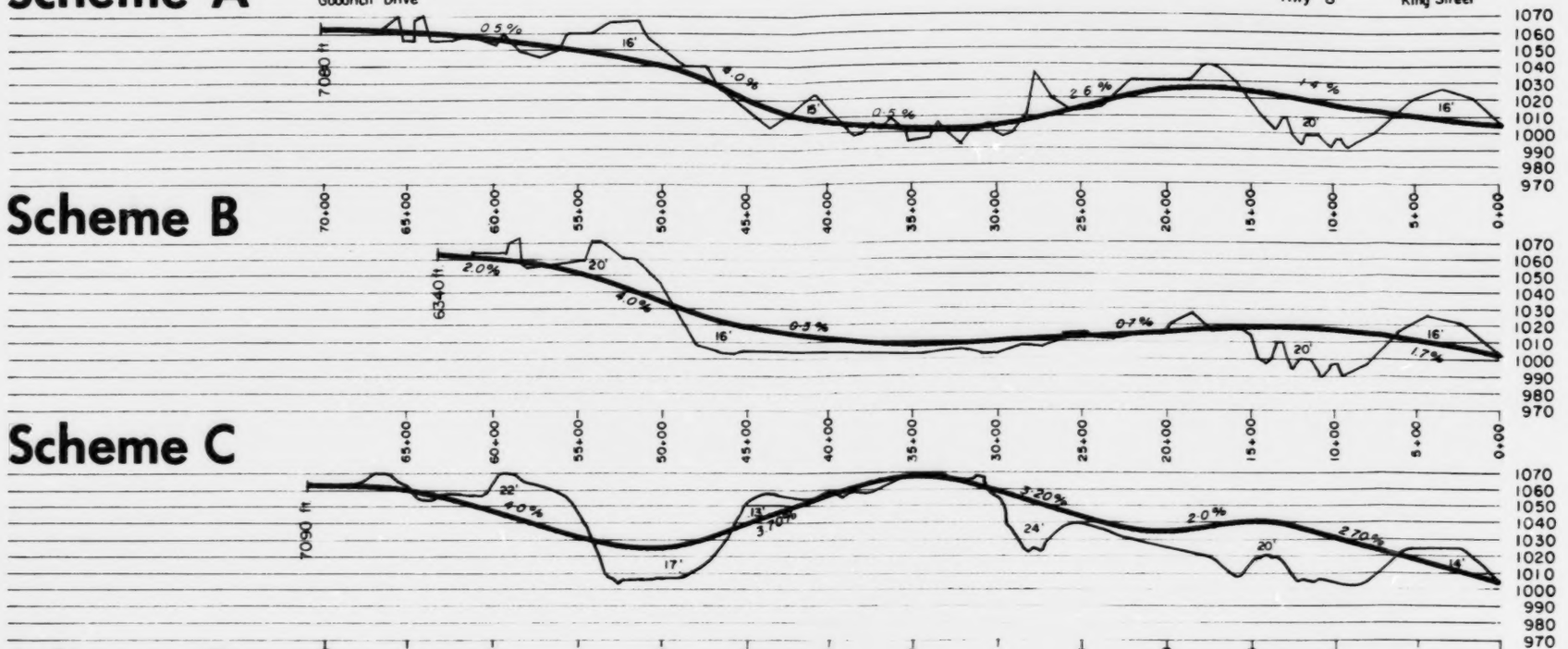
Plan 1

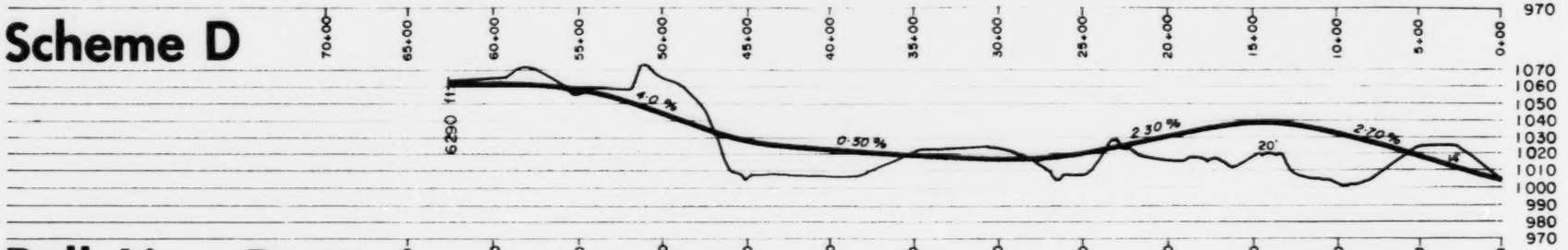
Scheme A



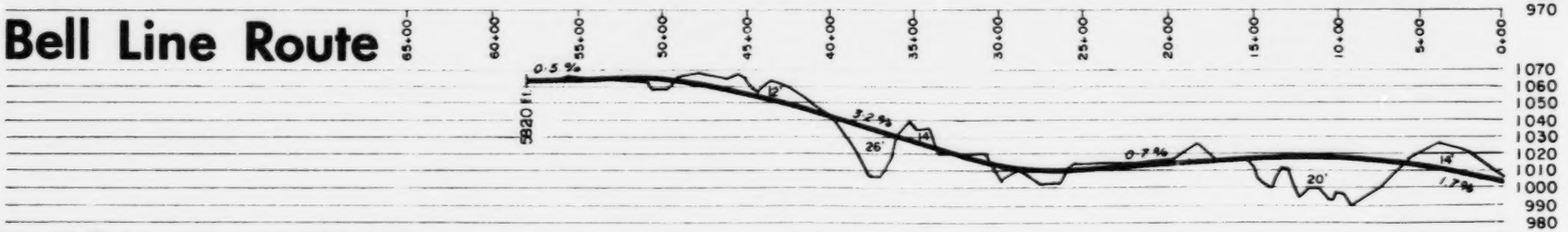
Scheme B

Scheme C

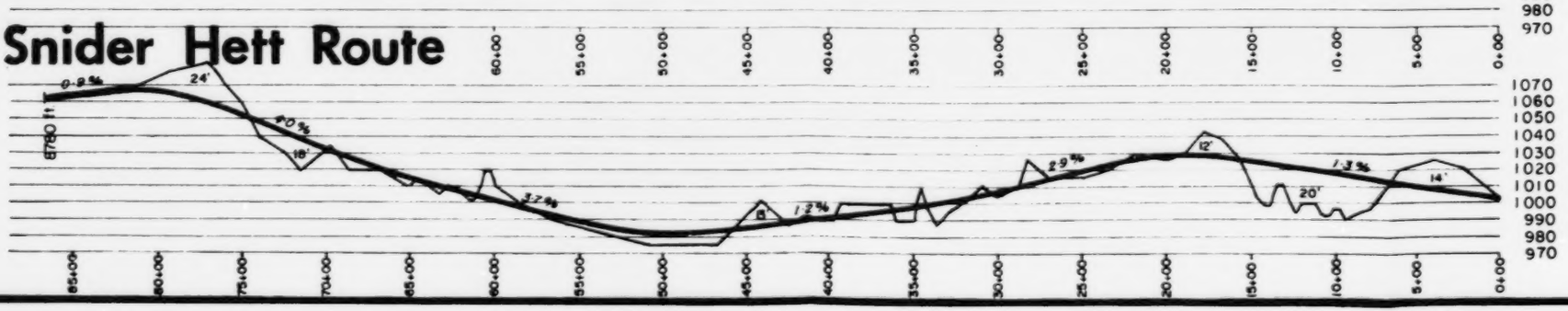
Scheme D



Bell Line Route



Snider Hett Route



Waterloo Region
River Road Extension

Route Location
Feasibility Study

Profiles of Alternative Routes

Knox Martin Kretch Limited

Scale : 1" = 800' h
1" = 80' v

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19 June 81
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Plan 2

Scheme A - Represents an eastern and southern corridor located north of the residential cluster on Hidden Valley Road South and maximizing separation from these residences by utilizing a sharper than desirable horizontal curvature.

Bell Line - Uses the most direct and shortest route through the study area along or adjacent to the existing Bell Telephone line alignment and easement.

Scheme B - Located on the north and west sides of the central wetland and esker portions of ESPA 27 as generally defined using the desired maximum horizontal curvature and remote from the existing residential clusters.

Scheme C - Represents a northern route using as much as possible of the existing Hidden Valley Road North right-of-way without passing through ESPA 27 but crosses Highway 8 at an oblique angle.

Scheme D - Another northern route following closely the north and west edges of the wooded portions of ESPA 27 with an oblique crossing of Highway 8.

3.5 ANALYSIS AND CORRIDOR SELECTION

Analysis and evaluation of the six Route Corridor Alternatives included preparation of preliminary plans and profiles at 1" = 200' illustrated on Plan 2, Profiles of Alternative Routes, and focused on four primary considerations:

Environment; Community; Geometry; Costs

An evaluation analysis of Alternative Routes was presented to Project Team Meeting I with the preliminary plan and profile drawings and referring to the defined Environmental Segments of each route. The evaluation is summarized as Chart 1. An expanded Scheme B Route Corridor as illustrated on Plan 3 was selected for further more detailed analysis and evaluation.

3.6 CORRIDOR EVALUATION AND ROUTE SELECTION

The Scheme B Corridor was subjected to more rigorous analysis and evaluation through preparation of calculated plans at 1" = 100' and accompanying profiles; environmental assessment of route segments; community planning considerations and preparation of estimated construction costs for the full facility based on 1980 benchmark costs.

After initial analysis, particularly of geometric constraints, two representative routes B-1 and B-2 as shown on Plan 3 were chosen which together utilized all of the corridor attributes.

A further evaluation analysis of the Routes within the selected Corridor was presented to Project Team Meeting 2 with the calculated plans and profiles to summarize the evaluation with particular reference to the primary considerations resulting in the selection of Route B-1. The evaluation is summarized as Chart 2.

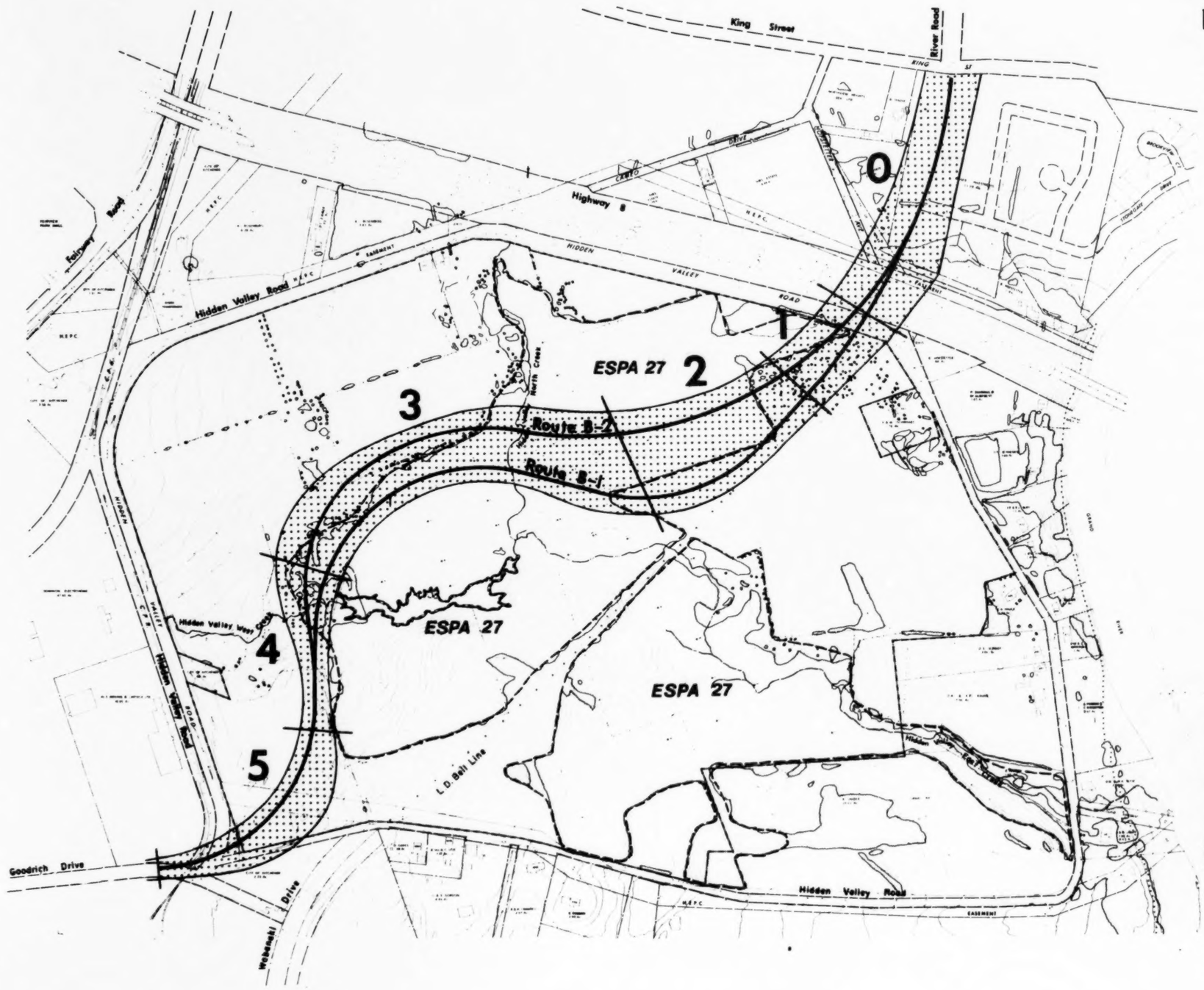
SUMMARY EVALUATION OF ALTERNATIVE ROUTES: PLAN I — CHART I

ROUTE & LENGTH Ft. & Mi.	ALIGNMENT LOCATION CONSIDERATIONS: Environment (Refer to Environmental Assessment Appendix 2.1)	Community	Geometry	Miles	Cost	$	SUMMARY EVALUATION
Snider-Hett 8780 ft. 1.65 m	Small impact at crossing of East Creek at narrowest part of ESPA.	Disruptive to existing residents on east and south legs of Hidden Valley Road. Would seriously intrude into and divide proposed future residential area in south	Grade 4% to 6% Grade 2% to 4% Grade below 2% Elevated over 5' Depressed over 8' Curvature 7° Acceptable grades and curvature	0.21 0.43 1.01 0.22 0.29 0.32	Road Bridge Ramps TOTAL	1,950,000 1,580,000 890,000 4,420,000	Not desirable for Community and Cost reasons
Scheme A 7080 ft. 1.34 m	Small impact at crossing of East Creek at narrow part of ESPA. Some woods and field vegetation lost and two ESPA woods areas separated. Some noise increase to existing residents on Hidden Valley Road south.	Disruptive to existing residents on east and south legs of Hidden Valley Road. Would not be a clear boundary location between proposed industrial & residential areas.	Grade 4% to 6% Grade 2% to 4% Grade below 2% Elevated over 5' Depressed over 8' Curvature 11° Curvature 7° Curvature 7° 11° curvature exceeds criteria.	0.19 0.23 0.91 0.18 0.24 0.19 0.14 0.08	Road Bridge Ramps TOTAL	1,740,000 1,580,000 890,000 4,210,000	Not desirable for Community and Geometry reasons
Bell Line 5820 ft. 1.09 m	Wide cuts and fills through middle of major ESPA vegetation & wildlife area. Separates wetland and esker portion of ESPA. Significant impacts on wildlife and trails	Very disruptive to few residents at west of Hidden Valley Road south leg. Would provide fair definition between proposed industrial and residential uses.	Grade 2% to 4% Grade below 2% Elevated over 5' Depressed over 8' Curvature 4.5° Good alignment and curvature.	0.29 0.80 0.20 0.17 0.12	Road Bridge Ramps TOTAL Burial of Bell Line 150,000	1,320,000 1,580,000 890,000 3,790,000	Most direct and least cost route but not desirable for environmental reasons
Scheme B 6340 ft. 1.19 m	Separates north woodlot & creek from major ESPA block. Minor impact on wetland and north bush.	Would provide good definition between proposed industrial and residential uses. Location reduces disruption to existing residents.	Grade 4% to 6% Grade 2% to 4% Grade below 2% Elevated over 5' Depressed over 8' Curvature 7° Curvature 7° Curvature 7° Acceptable grades and curvature	0.14 0.12 0.93 0.23 0.20 0.21 0.31 0.24	Road Bridge Ramps TOTAL	1,590,000 1,580,000 890,000 4,060,000	Suitable route with impact mitigation for wetland and North woodlot
Scheme D 6290 ft. 1.18 m	Small impact at crossing of North Creek. Minor impact on north woodlot.	Would reduce proposed industrial area if route is boundary. Not disruptive to existing residents.	Grade 4% to 6% Grade 2% to 4% Grade below 2% Elevated over 5' Depressed over 8' Curvature 7° Curvature 10° Curvature 10° 10° curvature exceeds criteria	0.14 0.37 0.67 0.18 0.16 0.05 0.11 0.19	Road Bridge Ramps TOTAL	1,510,000 3,190,000 890,000 5,590,000	Suitable but costly route because of long Highway 8 Bridge.
Scheme C 7090 ft. 1.33 m	Very little impact	Would provide poor definition between proposed industrial and residential areas or much reduced industrial area. Not disruptive to existing residents	Grade 4% to 6% Grade 2% to 4% Grade below 2% Elevated over 5' Depressed over 8' Curvature 7° Curvature 7° Curvature 10° 10° Curvature exceeds criteria	0.17 0.77 0.39 0.45 0.21 0.08 0.22 0.19	Road Bridge Ramps TOTAL	1,670,000 3,260,000 890,000 5,820,000	Not desirable for Community and Cost reasons although least environmental impact.

EVALUATION OF ROUTES WITHIN CORRIDOR: PLAN 3

CHART 2

ROUTE CONSIDERATION & OBJECTIVE	LOCATION EVALUATION ROUTE B-1 6340 ft. 1.2 miles	ROUTE B-2 6225 ft. 1.18 miles	EVALUATION CONCLUSION
ENVIRONMENT (Refer to Environmental Assessment Appendix 2.1)			
Allow retention of the most significant environmental resources in a substantial block and mitigate impacts for effective ongoing planning and management.	Environmentally preferred route because of location in high priority Segment 2, Segment 1 and east part of Segment 3. Segment 2 alignment minimizes environmental impacts whether or not development occurs in woodlot.	Not preferred environmental route although in preferred location in west part of Segment 3 and north part of Segment 4.	Route B-1 recommended.
	Length through ESPA 27 as generally defined 1925 ft. 0.36 mi.	Length through ESPA 27 as generally defined 1910 ft. 0.36 mi.	
COMMUNITY			
Optimize convenience to arterial through traffic; accessibility to local industrial and residential traffic; and yield of effective proposed development land, particularly industrial.	Convenience and accessibility good.	Convenience and accessibility good.	Future Community Plans served better by Route B-1
Minimize impact on existing groups of residences.	Yields about 123 acres industrial land.	Yields about 110 acres industrial land or 13 acres less than Route B-1. Depth of adjacent potential industrial sites reduced from 340' to 150' and 260' to 160'.	Greater potential industrial yield with better dimensions with Route B-1.
Effectively separate and serve the proposed industrial community to the north and west and the proposed residential community to the south and east.	Little traffic and noise impact on most existing residences.	Little traffic and noise impact on most existing residences.	
	Very effective industrial/ residential boundary in conjunction with Bell Long Distance Line.	Less effective industrial/ residential boundary because of potential residential pocket between Route and Bell Line.	
GEOMETRY			
Comply with Region Design Objective for 50 mph road	Complies with Objective	Complies with Objective	No significant difference.
	Length 6340 ft. 1.2 miles	Length 6225 ft. 1.18 miles	
Maximum Curvature 7°	Grade 4% 500' 0.09 mi.	Grade 5% 500' 0.09 mi.	
Maximum Gradient 6%	Grade 2% to 4% 700' 0.13	Grade 2% to 4% 700' 0.13	
Minimum Vertical Curve 600'	Grade below 2% 5140' 0.98	Grade below 2% 5025' 0.96	
Horizontal curves provide full superelevation runoff or spiral curve length	Curvature 7° 3780' 0.72 mi	Curvature 7° 2730' 0.52 mi.	
	Curvature 2°15' 1730' 0.33	Curvature 3°15' 2770' 0.52	
	Bridge Skew 9°	Bridge Skew 18°	
	Bridge Length 250'	Bridge Length 260'	
	Continuous Curves and spirals with greater length of 7° curvature	Continuous curves and spirals with greater bridge skew and curvature	
COST			
Optimize capital and maintenance costs.	Bridge 250 ft $1,580,000	Bridge 260 ft. $1,640,000	No significant difference.
	Ramps 890,000	Ramps 890,000	
Minimize disruption to existing Bell Telephone and Hydro facilities	Basic Road $170/ft 1,078,000 Clearing & grubbing Topsoil, Fine Grading, curb & gutter, storm sewers Granular B, Granular A, 5 lanes, Asphalt, Culverts	Basic Road $170/ft 1,058,000	
	Varying Items 143,000 Guardrail Seeding & sodding	Varying Items 128,000	
	Soil Excavation, Fill and compaction 307,000	Soil Excavation 330,000	
	Organic excavation & disposal 62,000	Organic excavation 24,000	
	Estimated Cost $4,060,000	Estimated Cost $4,070,000	
		Greater skew bridge length and excavation on slopes offsets saving in organic excavation and slightly shorter route.	


King Street
River Road
Highway 8
Fairway Road
Hidden Valley Road
HIDDEN VALLEY ROAD
ESPA 27
2
3
4
5
0
1
Route 8-2
Route 8-1
ESPA 27
ESPA 27
L.D. Belt Line
Goodrich Drive
Wabanaki Drive
Hidden Valley Road
Hidden Valley Creek
North Creek
Legend
Route Corridor
2 Environmental Segment
(refer to Appendix 2.1)
E.S.P.A. Boundary
(from W.R.O.P.P.)
Waterloo Region
River Road Extension
Route Location and
Feasibility Study
Selected
Route Corridor
Kror Martin Kretch Limited
Consulting Engineers, Planners, Landscape Architects
220 Advance Blvd., Brampton, Ontario L6T 4J5
19 June, 81
Dwg. 1348-D-9
Plan 3

Legend

Selected Route R.O.W.

E.S.P.A. Boundary
(from W.R.O.P.P.)

Waterloo Region
River Road Extension

Route Location and Feasibility Study

Selected Route B-1

Knox Martin Kretch Limited

Consulting Engineers, Planners, Landscape Architects 15 June 81
220 Advance Blvd., Brampton, Ontario L6T 4J5 Dwg. 1369-D-15

Plan 4

4. THE RECOMMENDED ROUTE

4.1 ROUTE DESCRIPTION

The recommended route is B-1 within the B Corridor as shown on Plan 4. The selection is judged to most effectively combine compliance with the established Geometric Design Criteria; acceptable residual environmental impact after appropriate mitigation; accommodation of community planning options and cost effectiveness.

The selected route connects well to existing River Road at King Street East, crosses Highway 8 on a 2° 15' curve at a 9° skew angle, abuts the trunk Bell Telephone pole line, avoids most of the south edge of the north woodlot, intrudes into the north and west fringes of the environmentally sensitive central wetland and esker ESPA 27 as presently defined and joins existing Goodrich Drive at Hidden Valley Road through three 7° curves and two reverses. It allows accommodation of a full interchange with Highway 8.

The selected route will provide an almost continuously curving connection from existing River Road to Goodrich Drive with potentially very interesting vistas and views particularly of the central wetland and esker which will abut the route for a distance of about 2,700 feet on the south side.

4.2 FUNCTIONAL DESIGN

4.2.1 Horizontal and Vertical Alignment

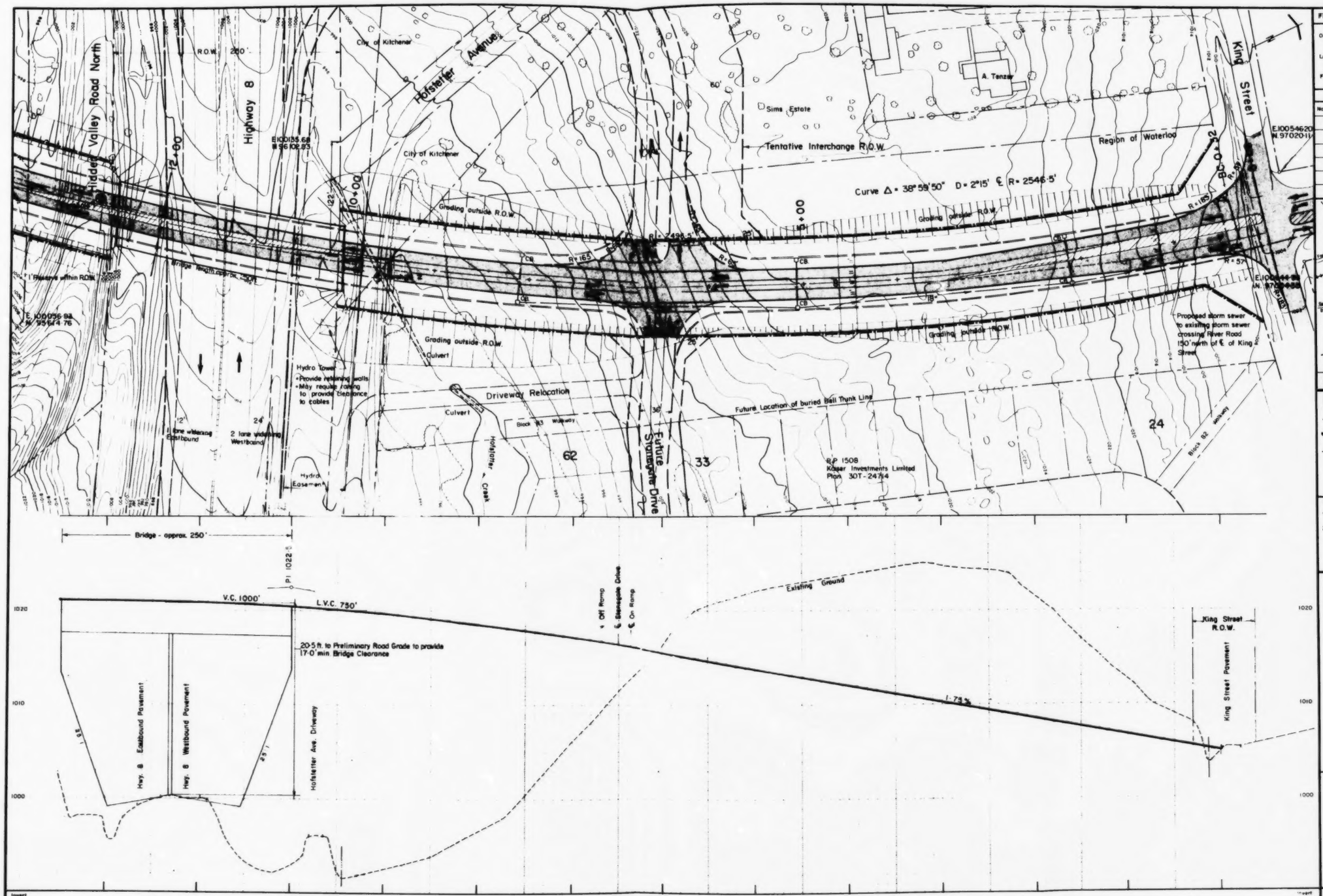
The functional design for the selected route is illustrated on Plan Profile drawings 1,2,3,4 and 5.

The Horizontal Alignment complies with the design criteria of 7° maximum curvature and full superelevation runoff or spiral curve length. Of the total route length of 6340 feet or about 1.2 miles, 3780 feet has 7° curvature with two reverses and 1730 feet has 2° 15 minute curvature.

Where possible the horizontal alignment is related to coordinated points on the City of Kitchener grid sheets. Surveys of the recommended right-of-way should be integrated into the existing boundary surveys either by a separate survey at this time or following processing of Draft Plans of Subdivision through the draft approval and registration stages.

The vertical alignment is designed to essentially balance cut and fill for River Road recognizing the presence of topsoil and organic materials. Of the 6340 foot length, 5140 feet have grades less than 2%; 700 feet has grades from 2% to 4% and only 500 feet is at 4% grade. 1000 feet visibility curves are provided at the Highway 8 interchange and 900 feet and 800 feet vertical visibility curves are provided elsewhere at grade changes to improve sight distances above the minimum design criteria of 600 feet.

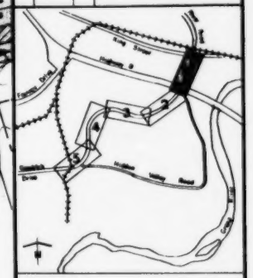
The horizontal and vertical alignments are preliminary. They should be carefully reviewed and refined at the detailed design stage when information concerning the type and form of adjacent urban development, the location of intersecting local streets and the requirements for Municipal services and utilities are available. Particular attention must be given to accommodate the provisions or options available for the Highway 8 interchange.



Field Books	Designed	Date
	R.V.	2 Sept 80
Original	Drawn	Date
	I.P.	2 Sept 80
Layout	Checked	Date
	R.V.	June 81
Final	Approved	Date
	J.A.S.K.	June 81

Revisions

No	Date	By	Description



Key Plan scale 1"=1600'

Legend

- Existing Property Line
- Proposed Right-of-Way
- Proposed Stage Pavement Edge
- Future Curb for Stage 2

Notes

1. Coordinates calculated from City of Kitchener grid sheet 100-94, 100-96.
2. Intersection designs to be finalized at detail design stage

Regional Municipality of Waterloo

River Road Extension

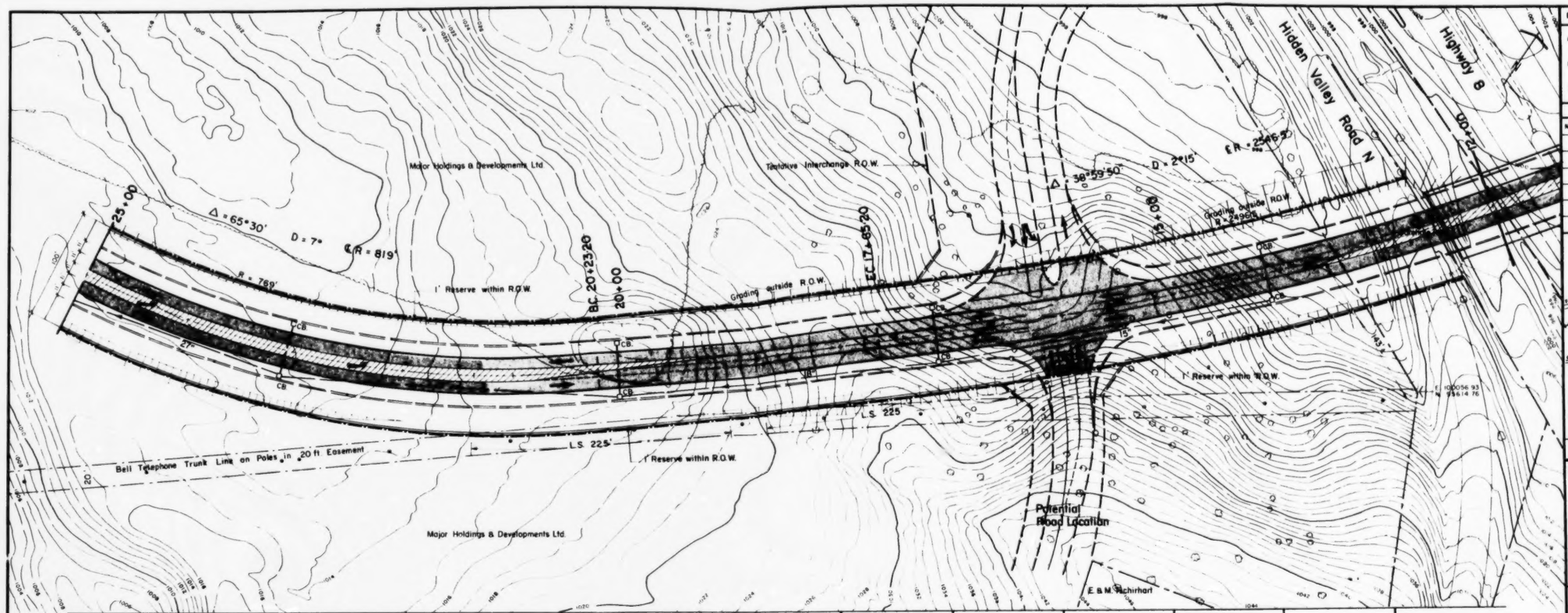
Route Location and Feasibility Study

Plan and Profile

Sta. 0+00 to Sta. 12+00

Knox Martin Kretch Limited
Consulting Engineers
Planners
Landscape Architects
220 Advance Blvd., Brampton, Ontario
L6T 4J5 (416) 459-4190

Scale	Plan Profile
Horiz 1" = 40' Vert 1" = 4'	1
Date 19 June 1981	
File Reference 1348-A-12	Revision



Field Books	Designed	Date
Original	R.V.	2 Sept 80
Layout	Drawn I.P.	Date 2 Sept 80
Final	Checked R.V.	Date June 81
	Approved J.A.J.K.	Date June 81

Revisions

No	Date	By	Description

Key Plan scale 1"=1600'

Legend

- Existing Property Line
- Proposed Right-of-Way
- Proposed Stage I Pavement Edge
- Future Curb for Stage 2

Notes.

1. Coordinates calculated from City of Kitchener grid sheet 100-96, 100-94, 97-94.
2. Intersection designs to be finalized at detail design stage.

Regional Municipality of Waterloo
River Road Extension

Route Location and Feasibility Study

Plan and Profile
Sta. 12+00 to Sta. 25+00

Knox Martin Kretch Limited
Consulting Engineers
Planners
Landscape Architects
220 Advance Blvd., Brampton, Ontario
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Scale
Horiz 1" = 40'
Vert 1" = 4'

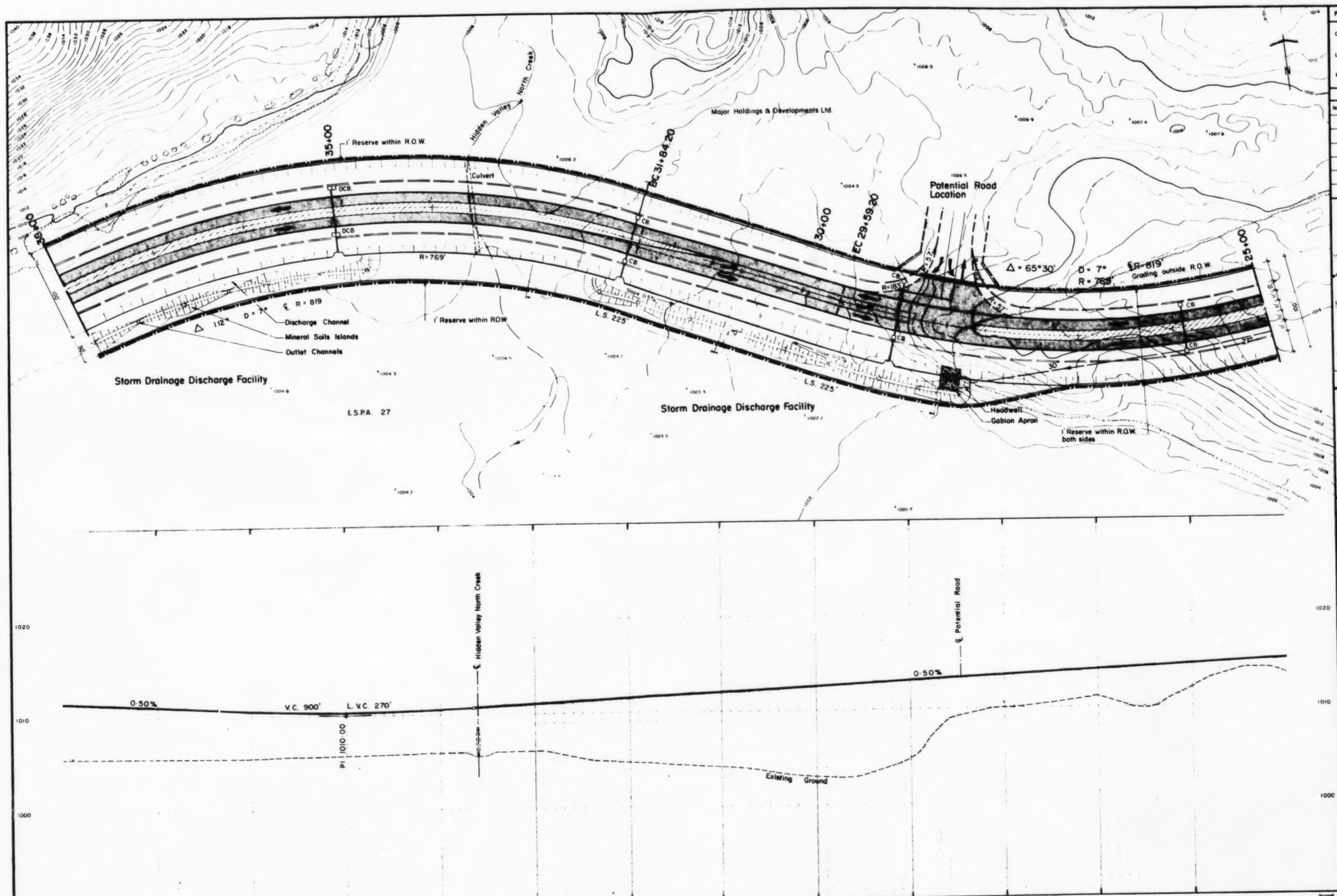
Date
19 June 1981

File Reference
1348-A-13

Plan Profile

2

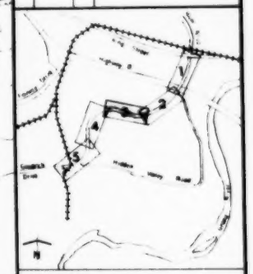
Revision



Field Books	Designed	Date
	R.V.	2 Sept 80
Original	Drawn M.I.P.	Date 2 Sept 80
Layout	Checked R.V.	Date June 81
Final	Approved J.R.K.	Date June 81

Revisions

No	Date	By	Description



Key Plan scale 1" = 1000'

Legend

- Existing Property Line
- Proposed Right-of-Way
- Proposed Stage 1 Pavement Edge
- Future Curb for Stage 2

Notes :

1. Coordinates calculated from City of Kitchener grid sheet 97-94
2. Intersection designs to be finalized at detail design stage

Regional Municipality of Waterloo

River Road Extension

Route Location and Feasibility Study

Plan and Profile

Sta. 25+00 to Sta. 38+00

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Consulting Engineers
Planners
Landscape Architects
220 Advance Blvd., Brampton, Ontario L6T 4J5 (416) 459-4780

Scale	
Horiz	1" = 40'
Vert	1" = 4'
Date	19 June 1981
File Reference	1348-A-14

Plan Profile **3**

Revision

Potential Road Location

Hidden Valley West Creek enclosed in 60" dia. Storm Sewer

Major Holdings & Developments Ltd.

Grading outside R.O.W.

Typical Storm Sewer stub for future connection

1' Reserve within R.O.W. both sides

60" Storm Sewer

Headwall

Gabion Apron

Discharge Channel

Mineral Soil Islands

Outlet Weirs

Section A-A

Storm Drainage Discharge Facility

E.S.P.A. 27

Δ = 112°

D = 7°

R = 819°

L.S. 225'

E.C. 47+84.20

B.C. 50+22.50

45+00

40+00

50+00

55+00

Slope 0.8%

4.00%

4.00%

0.50%

V.C. 800'

L.V.C. 748'

P.I. 1014.70

℄ Potential Road

℄ West Creek

Existing Ground

Invert

Proposed Grades: 040.10 040.08 | 037.10 | 033.10 | 029.68 029.10 | 025.41 | 022.71 | 018.41 | 017.98 | 017.72 | 015.38 | 013.92 | 013.00 | 012.83 | 012.50 | 012.00 | 011.50

Chainage: BC 50+00 EC 50+22.50 BVC | 50+00 | 49+00 | 48+00 EVC 48+14 | 47+00 | 46+00 | 45+00 | 44+60 | 44+00 | 43+00 | 42+00 | 41+00 | 40+00 BVC 40+66 | 40+00 | 39+00 | 38+00

Invert

Proposed Grades

Chainage

Field Books

	Designed	Date
Original	B.V.	2 Sept. 80
Layout	Drawn W.I.P.	Date 2 Sept. 80
Final	Checked B.V.	Date June 81
	Approved J.B.K.M.	Date June 81

Revisions

No	Date	By	Description

Key Plan scale 1" = 1600'

Legend

- Existing Property Line
- Proposed Right-of-Way
- Proposed Stage 1 Pavement Edge
- Future Curb for Stage 2

Notes

1. Coordinates calculated from City of Kitchener grid sheet 97-94
2. Intersection designs to be finalized at detail design stage

Regional Municipality of Waterloo

River Road Extension

Route Location and Feasibility Study

Plan and Profile

Sta. 38+00 to Sta. 51+00

Knox Martin Kretch Limited

Consulting Engineers
Planners
Landscape Architects

220 Advance Blvd., Brampton, Ontario
L6T 4J5 (416) 459-4780

Scale
Horiz 1" = 40'
Vert 1" = 4'

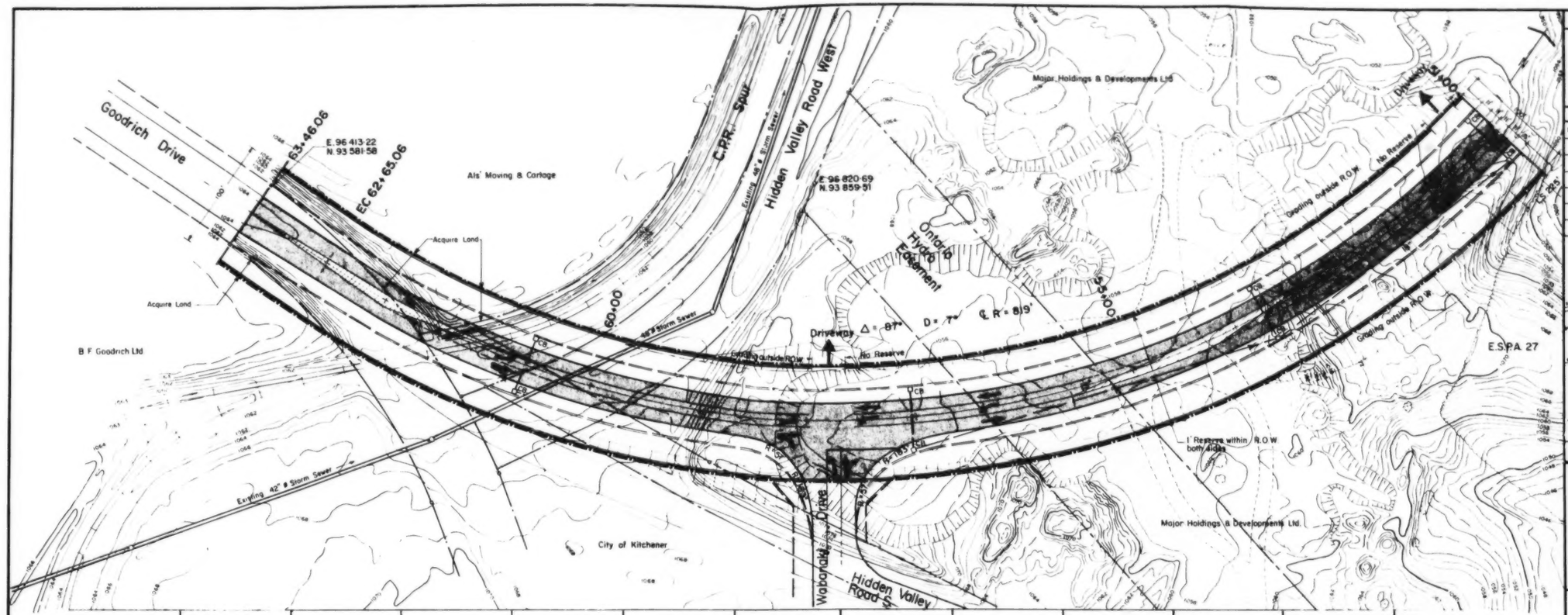
Date
19 June 1981

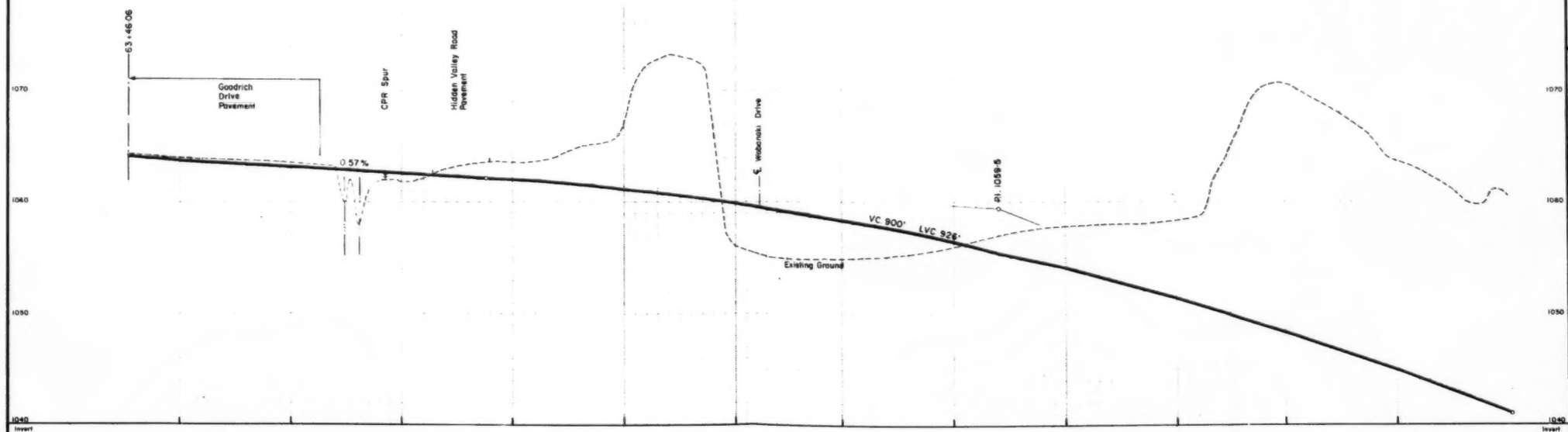
File Reference
1348-A-15

Plan Profile

4

Revision





Proposed Grades	1063.72	1063.15	1062.58		1062.00	1061.16	1059.96	1058.37	1056.42	1055.36	1054.11	1051.40	1048.34	1044.90	1041.10	Proposed Grades
Chainage	63+00	62+00	61+00	EVC 60+65.06		59+00	58+00	57+00	56+00	BVC 55+60	55+00	54+00	53+00	52+00	51+00	Chainage

Field Books

	Designed	Date
Original		
Layout	Drawn	Date
	Checked	Date
Final	Approved	Date

Revisions

No	Date	By	Description

Key Plan scale 1" = 1600'

Legend

- Existing Property Line
- Proposed Right-of-Way
- Proposed Stage I Pavement Edge
- Future Curb for Stage 2

Notes :

1. Coordinates calculated from City of Kitchener grid sheets 97-94, 97-92, 94-92
2. Intersection designs to be finalized at detail design stage

Regional Municipality of Waterloo

River Road Extension

Route Location and Feasibility Study

Plan and Profile

Sta. 51+00 to Sta. 63+46.06

Knox Martin Kretch Limited
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Planners
Landscape Architects
220 Advance Blvd., Brampton, Ontario, L6T 4J5 (416) 459-4780

Scale
Horiz 1" = 40'
Vert 1" = 4'

Date
19 June 1981

File Reference
1348-A-16

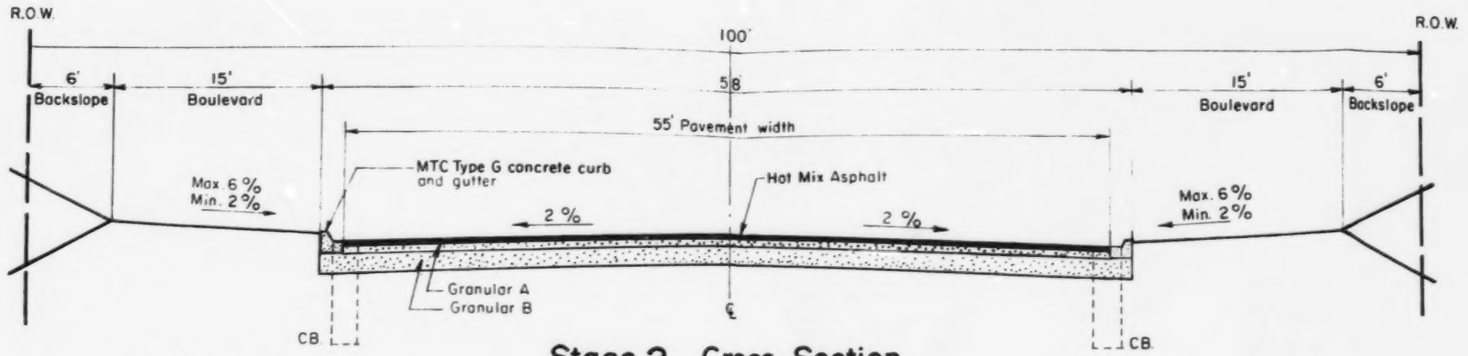
Plan Profile

5

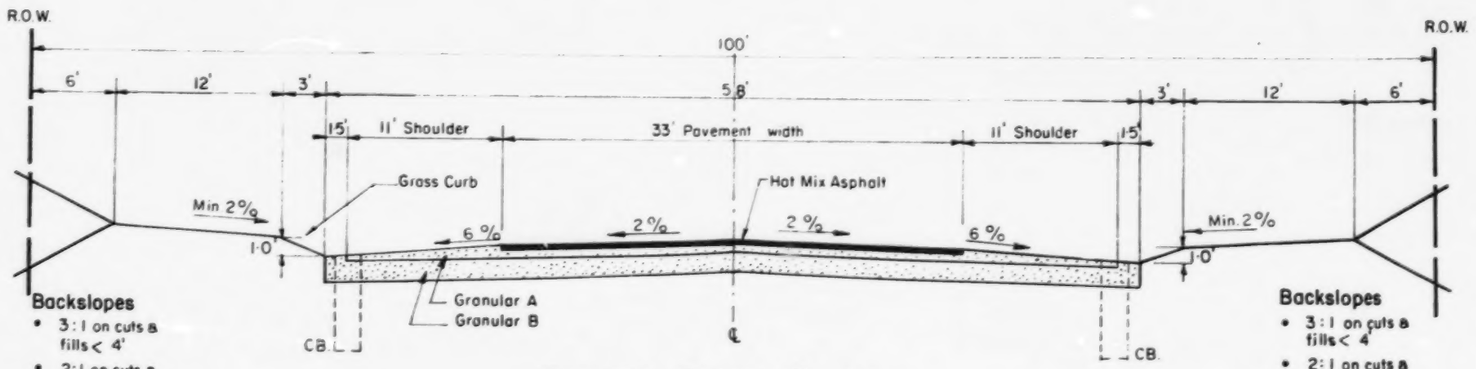
Revision

Notes:

1. Pavement design subject to recommendation of Geotechnical Consultant
2. Boulevard slope and width may be varied or reversed through E.S.P.A.



Stage 2 Cross-Section



Stage I Cross - Section

Waterloo Region
River Road Extension

Route Location and Feasibility Study

Staged Cross-Sections

Knox Martin Kretch Limited
Consulting Engineers, Planners, Landscape Architects
220 Advance Boulevard, Brampton, Ontario. L6T 4J5

0 10 Feet

19 June 81
1348 - D - 19

Plan 5

4.2.2 Cross-Section

It is recommended that River Road Extension be constructed in stages to an ultimate basic four lane undivided urban cross-section with auxilliary turning lanes within a basic 100 feet right-of-way to accommodate the primary road function anticipated and adopted in the 1979 Regional Transportation Plan Review. The right-of-way widens to 130 feet to include the storm drainage discharge facility.

To mitigate the turning movement conflicts to and from the connecting roads and entrances on the almost continuously curving alignment a central continuous turning lane is recommended from King Street, chainage 0+00, to the connection with Goodrich Drive at chainage 63+46. Complementary improvements will be required at the intersection with King Street.

A 1 foot reserve will be established on both sides of the road within the right-of-way except at public road connections and the location noted on Plan Profile 5. The Stage 1 and Stage 2 requirements are illustrated on Plan 5, Staged Cross-sections.

The Stage 1 Cross-Section provides two 11 feet paved through lanes and an 11 feet paved central turning lane with 11 feet granular shoulders for future paved travel lanes, granular base for future curb and gutter, a 3 feet grass curb rising 1 foot, and 12 feet grass boulevards. Catchbasins are located at the grass curb in their final locations.

The Stage 2 Cross-Section completes the five paved lanes with curb and gutter and widens the boulevards to 15 feet.

At a number of locations grading for the road facility will extend beyond the basic 100 feet right-of-way. When future urban development abuts the right-of-way in such locations provision should be made in the subdivision grading plans to integrate grades with the roadway and with noise attenuation provisions where appropriate.

4.2.3 Highway 8 Interchange

With the concurrence of the Ministry of Transportation and Communications it is recommended that lands be protected to allow ultimate construction of a full parclo AB configuration on the west wide of the bridge structure to form the River Road Extension interchange with Highway 8.

Further geotechnical investigations and special consideration will be required for the design of the north bridge abutment because of the presence of soft organic/alluvial soils and the high voltage hydro wires and towers.

Local roads will cross intersect with River Road Extension at the interchange ramps.

4.2.4 Environmental Impact Mitigation

The impact mitigation for the recommended road alignment is incorporated into the engineering planning for the road and by the provision of storm drainage discharge facilities. Thus the location of the road as well as the recommended drainage scheme are both forms of impact mitigation.

Further impact mitigation should be implemented during construction. Primarily this includes incorporating protection of the wooded edges both near the northern woodlot as well as near the esker formation during final detailed design of the road. Temporary structures such as snow fences and berms may be required to protect the wetlands or the wooded edges from the intrusion of excessive sediment loads and heavy machinery.

In those areas where the road will create a new edge to an already wooded area mitigation should consist of a thinning program to encourage the survival of the hardy trees. This process should be initiated well in advance of actual road construction and clearing.

It is recommended that, following road construction and dedication of the adjacent ESPA lands, a management plan be developed for the continued management of the ESPA.

4.2.5 Surface and Storm Drainage

The recommended urban road cross-section incorporates storm sewers as part of the Stage I construction. Some drainage from adjacent lands will be conveyed through the catchbasins to the road storm sewers. At the detailed design stage consideration must be given to the grading and drainage of the adjacent lands which should incorporate an integrated storm water management plan for the Hidden Valley Creek shed.

To implement the proposed environmental mitigation measures it is recommended that the storm sewer outfalls discharge into a special Storm Drainage Discharge Facility as illustrated in preliminary form on Plan Profiles 3 and 4. This Facility will encourage the surface and storm drainage to disperse over a wide area into the wetland which will carry out a water conditioning function before discharging to the Grand River through Hidden Valley East Creek.

4.2.6 Access Control

Access to River Road extension between King Street East and the potential road location at about chainage 45+45 is confined to public roads only with the exception of the lands abutting on the north side between chinages 34+80 and 42+15 in which area the specifics of site access will be determined at the plan approval stage. The recommendation of the Project Team is that access to these abutting lands be confined to one joint access.

Between the potential road location at about chainage 45+45 and the project limit at chainage 63+46.06 access on the north side will be confined to two locations at about chainage 51+30 and opposite the proposed connection to Wabanaki Drive at about chainage 57+77.

4.2.7 Phasing

It is recommended that River Road Extension be constructed in two Stages which respond to the traffic warrants. Stage I will comprise a three lane facility from Station 0+00 to 63+46 including the Highway 8 bridge structure and interchange ramps. Stage 2 will widen the facility to five paved lanes.

4.2.8 Estimated Construction Costs

The estimated construction costs in 1981 dollars for the two stages of construction to the Stage 2 ultimate cross-section based on the benchmark costs and including design, construction administration charges and contingencies are as follows:

STAGE 1	6346 feet of three lane paved roadway on four lane base with grass curbs, storm sewers and appurtenances and storm drainage discharge facilities.	$1,350,000.
STAGE 2	Completion of 6346 feet of facility with five paved lanes, curb and gutter	$ 250,000.
	Bridge structure 250 feet long, ramps and utility relocation.	$2,500.000.
	TOTAL ESTIMATED COST	$4,100,000.

4.2.9 Estimated Traffic Noise

Sound levels produced by traffic on River Road Extension were estimated by the Leq Traffic Noise Prediction Method, an empirical noise prediction method developed by the Ontario Ministry of Transportation & Communications and adopted by the Ontario Ministry of the Environment. The method adopts the following relationship between traffic volume, traffic speed, distance and sound level.

$$Leq = 49.5+10.2 \log_{10} (Vc+6Vt) - 13.9 \log_{10} D+0.21S$$

where Leq = energy equivalent sound level during an hour, in dBA

Vc = hourly volume of cars with GVW less than or equal to 10,000 lb

Vt = hourly volume of trucks with GVW greater than 10,000 lb

D = distance in feet from the edge of pavement to the observer location

S = posted speed in mph

The estimated sound levels were calculated for the volume of traffic predicted by the Region Traffic Response Study at the 400,000 Regional population level with full Hidden Valley development and all movements permitted at the River Road-Highway 8 connection illustrated on Figure 1.

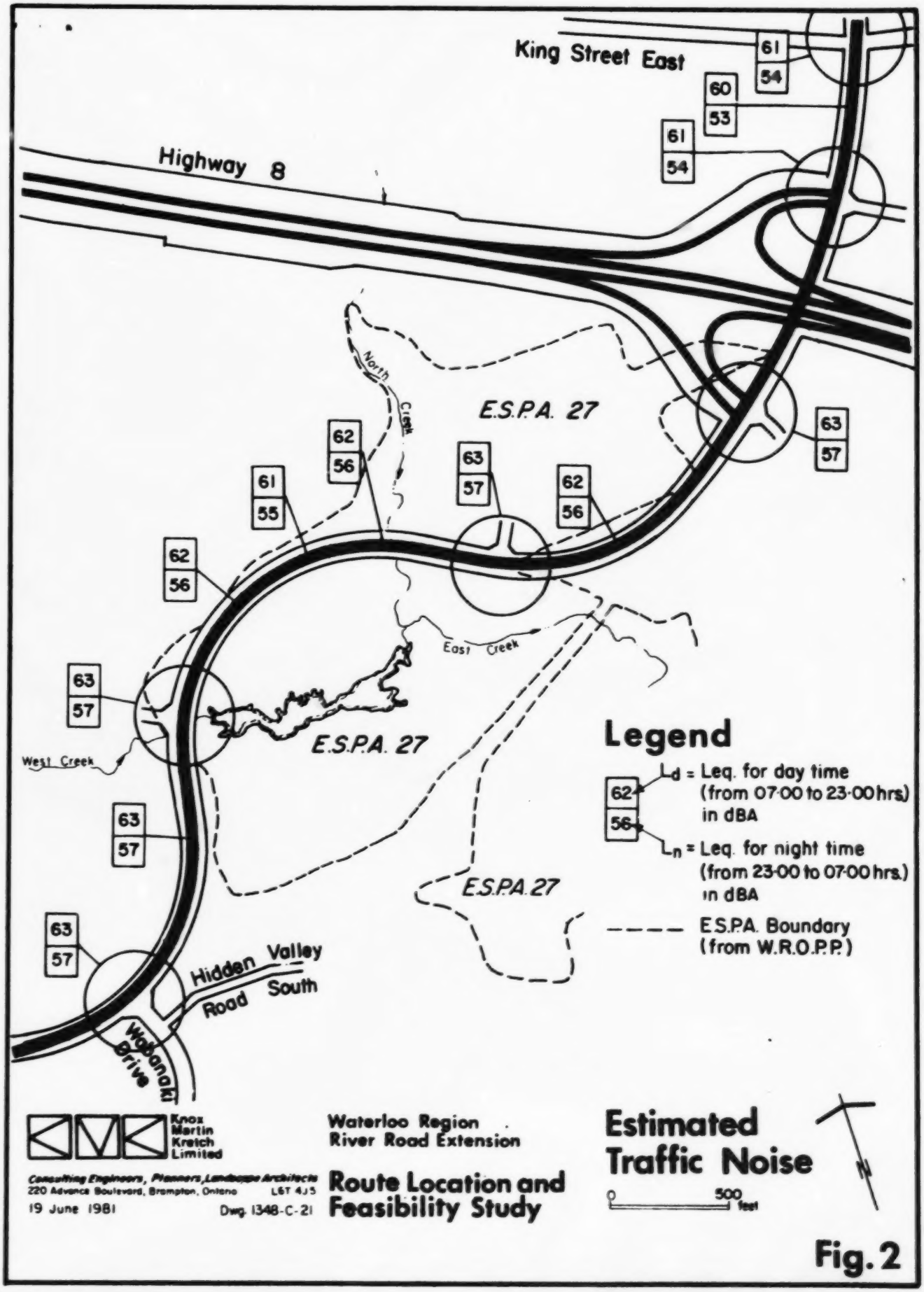

King Street East
Highway 8
61
54
60
53
61
54
North Creek
E.S.P.A. 27
62
56
63
57
61
55
63
57
62
56
62
56
East Creek
63
57
E.S.P.A. 27
West Creek
63
57
E.S.P.A. 27
63
57
Hidden Valley Road South
Wabanaki Drive
Legend
62
56
Ld = Leq. for day time (from 07-00 to 23-00 hrs.) in dBA
Ln = Leq. for night time (from 23-00 to 07-00 hrs.) in dBA
E.S.P.A. Boundary (from W.R.O.P.P.)
Knox Martin Kretch Limited
Consulting Engineers, Planners, Landscape Architects
220 Advance Boulevard, Brampton, Ontario L6T 4J5
19 June 1981
Dwg. 1348-C-21
Waterloo Region
River Road Extension
Route Location and Feasibility Study
Estimated Traffic Noise
0
500 feet

Fig. 2

Average day-time traffic noise levels L_d between 0700 and 2300 hours and night-time L_n levels between 2300 and 0700 hours were estimated based on 90% of the average annual daily traffic (A.A.D.T.) occurring during the 16 day-time hours and 10% during the 8 night-time hours.

Noise level predictions were further modified by applying a coefficient for truck volume modification on gradients as follows:

Gradient %	Coefficient for truck volume multiplication
Less than 2%	1.0
3 - 4 %	1.5
5 - 6 %	2.0

To recognize sound levels associated with interrupted traffic flow at intersections a factor of 2 dBA is added and a factor of 1 dBA is added for locations between 200 and 500 feet distant from an intersection.

The topography of the lands adjacent to River Road is very severe in some locations and major grading will be required to serve the land for development. The attenuation effects of the depressed and elevated portions of the roadway should be applied to the estimated noise levels after the elevations of adjacent development lands are established.

Figure 2 illustrates the estimated traffic noise levels at a distance of 100 feet from the edge of the pavement. These noise levels are acceptable for the proposed industrial and office uses north of the route but are greater than the recommended maximum of 55 dBA for outdoor residential areas. Satisfactory noise attenuation measures should be devised at the time detailed proposals for residential development south of the route are reviewed.